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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/943,321	08/30/2001	Stuart A. Sanders	01 - 414	8735

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EXAMINER

JACKSON, ANDRE L

ART UNIT

PAPER NUMBER

3677

DATE MAILED: 02/27/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/943,321

Applicant(s)

SANDERS ET AL.

Examiner

Andre' L. Jackson

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 06 February 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-15 and 17-24 is/are rejected.
- 7) ☒ Claim(s) 16 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 August 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 6.

- 4) ☐ Interview Summary (PTO-413) Paper No(s) \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### **Election/Restrictions**

Applicant's election without traverse of Group I in Paper No. 7 is acknowledged.

### **Claim Rejections - 35 USC § 103**

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 2, 4-14 and 17-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over USPN 5,388,959 to Forrester et al in view of USPN 6,475,253 to Culler et al. Forrester et al discloses a seal assembly for use in a gas turbine engine comprising a seal substrate (22) and an abradable seal material applied to a bond layer (42); the abradable seal material being composed of a densified epoxy foam; and an engine component adapted for motion relative to the seal assembly and having an abrasive portion (defined by its end tip) interacting with the abradable seal material, whereby the abrasive portion of the engine component and the abradable seal material of the seal assembly cooperate to provide sealing. However, Forrester et al does not specifically disclose that the abradable seal material is composed of a polyimide foam. It is well known within the art that an epoxy resin is made of a polymeric material. Culler et al teaches abrasive articles including substrates or particles bonded thereto (column 19, lines 47-66. These abrasive articles can be bonded, coated or non-woven abrasive articles. Suitable material for coated or bonded articles may include polymeric foam.

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Culler et al goes further to give information of various types or equivalent composition of polymeric material, which include a polyimide film. Therefore, since the epoxy foam as disclosed by Forrester et al is equivalent to a polyimide foam taught by Culler et al, the selection of any of these known equivalents bonded to a layer as claimed, would be within the level of ordinary skill in the art.

Referring to claims 4-6 and 19-21, Forrester et al discloses that the epoxy foam has a density of 25 pounds per cubic foot.

Referring to claims 7 and 22, Forrester et al does not disclose shear strength of the epoxy foam within a range of 140 psi to 325 psi, however, it would have been obvious to one having ordinary skill in the art at the time of applicant's invention to modify the seal assembly of Forrester et al, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges as claimed involves only routine skill in the art.

Referring to claims 9, 10, 13 and 14, Forrester et al discloses a stator casing (10) affixed to the seal substrate, which provides an annular surface, which is disposed between tips (26) of fan blades (28) of a rotor (30). See column 2, lines 40-45.

Claims 11 and 18, the epoxy foam is a thermo-mechanically densified foam.  
See column 3, lines 9-37.

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Claims 3 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Forrester et al in view of Culler et al and further in view of USPN 3,834,001 to Carroll et al. Forrester et al as described above, includes a bond layer of densified epoxy foam disposed at a seal face or an inner annular surface, but Forrester et al does not disclose a seal substrate comprising a plurality of layers of densified epoxy foam. Carroll et al teaches a seal element (22) usable as a seal in a turbo-machine. The seal element includes a radial extending inner seal face (24) and rear face (26). Sheets or layers (27) are stacked and bonded to one another with their edges at the seal face and rear face respectively. Each layer includes a laminated plane (28) arranged perpendicular to an engine wheel. The seal structure providing a low density, which may be abraded without undue damage to structure which comes in contact with it. Therefore, it would have been obvious to one having ordinary skill in the art at the time of applicant's invention to modify the seal assembly of Forrester et al to include multiple laminate layers as taught by Carroll et al to provide an abradable seal having a low density and good resistance to structure which comes in contact with it.

#### **Allowable Subject Matter**

Claim 16 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

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### Conclusion

Additional references are cited on the PTO 892 form but were not used to determine patentability of this application instead the references gave background information on abradable seals.

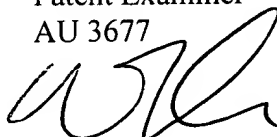
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andre' L. Jackson whose telephone number is (703) 605-4276. The examiner can normally be reached on Mon. - Fri. (9 am - 5 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, J. J. Swann can be reached on (703) 306-4115. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9326 for regular communications and (703) 872-9327 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1018.

ALJ  
February 21, 2003

André L. Jackson  
Patent Examiner  
AU 3677



WILLIAM MILLER  
PRIMARY